

(Demo) Annual Narrative



FWSANV-0196

Malheur National Wildlife Refuge

Burns, Oregon

Narrative Report for period May 1 to August 31, 1950

Roster of Regular Personnel

John C. Scharff	Superintendent
Ray C. Erickson	Biologist
Marselle Leake	Supt. of Construction
Kenneth W. House	Refuge Mechanic
Alfred S. Ludi	Refuge Maintenance Man
Gladys V. Howe	Clerk
Albert Olofson	Refuge Maintenance Man
Judd A. Wise	Refuge Maintenance Man
Noel L. Cagle	Refuge Maintenance Man
Frank McElhone	Refuge Maintenance Man
John Porter	Refuge Maintenance Man

Temporary Personnel

Elmer Ash	Dragline Operator
Lynn Comegys	Oiler
Deforest Thompson	Laborer
John A. Younger	Laborer

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Malheur National Wildlife Refuge
Second Period Narrative Report
May 1 to August 30, 1950

I GENERAL

A. Weather Conditions.

The following is a summary of weather conditions recorded at the refuge headquarters during May through August, 1950:

	<u>Precipitation</u>	<u>Max. Temp.</u>	<u>Min. Temp.</u>
May	.49	80	22
June	1.34	91	31
July	(trace)	96	36
August	.06	97	32
Totals	1.89	Extremes 97	22

Precipitation recorded at the P-Ranch, Diamond, and Double O Ranch refuge weather stations was as follows:

	<u>Precipitation</u>		
	<u>P-Ranch</u>	<u>Diamond</u>	<u>Double O</u>
May	1.14	.59	.09
June	1.54	1.43	1.40
July	(trace)	.09	.09
August	1.03	.46	.05
Totals	3.71	2.57	1.63

After the very dry weather of April, when most resident ranchers had expressed considerable apprehension regarding their forthcoming hay crop, a modest rainfall during the first week of May, followed by additional showers in June, provided the necessary moisture to produce at least an average grass crop this year. As usual, the greatest amount of precipitation was recorded at the P-Ranch station, followed in order by Diamond, Sod House headquarters, and Double O Ranch.

The total precipitation was a minus .71 inches below the perrenial average for this four-month period. Average temperatures for the four months were: May, 2.2 degrees below the average; June, 0.8 degrees below; July, exactly average; and August, 0.9 degrees above the average.

B. Water Conditions.

Surface elevations of Malheur Lake as recorded on the staff gauge at the mouth of the Blitzen River during this period are:

	<u>Gauge Readings</u>
May	4091.85 ft. a.s.l.
June	4091.84
July	4091.34
August	4090.85

The decline in Malheur Lake levels which followed the breaching of Cole Island Dike continued during the present period and no summer peak was experienced this year. During the drop in levels of one foot, an estimated 11,000 acres of the more desirable sago pondweed zone emerged as mud flats and largely were lost to waterfowl utilization, with about 18,000 acres of lake remaining on August 31, 1950.

The slightly more-than-average quantity of snow on the areas measured on the Steens Mt. failed to produce an average run-off from the Blitzen drainage. Late rains in May and June, together with many cool nights, tended to retard water loss early in the summer, but with the hot, dry, windy weather of July and August, evaporation and transpiration caused the lake to dwindle more rapidly.

The reduced water supply of water in the Blitzen Valley required very close attention in order to get maximum use in the ponds and meadows. In spite of the water shortage, all of the better ponds and marshes were held at capacity and in the meadows at least an average hay crop was produced.

C. Fires.

Because of the very late season this year, the fire hazard was reduced, although it is expected to increase if periodical fall rains do not provide some protection. During a local thunder shower on August 10 a stack yard containing about 100 tons of hay on the Dunn Field to the south of Sod House Ranch was struck by lightning and burned. The fire did not spread to nearby bunched hay since the heavy shower had drenched the short mowed grass around the hay corral, but the burned stack required frequent later visits to forestall re-ignition. This fire was on private land and no other fires were reported on or adjacent to the refuge during this period.

II WILDLIFE

A. Migratory Birds.

1. Populations and Behavior.

Following the reduced migration reported for the first period, most species of birds remaining to nest were also somewhat below average nesting numbers. The very dry spring and accompanying shortage of water decreased the attractiveness of much of the Blitzen Valley nesting habitat, as well as on the shrunken Malheur Lake, while in the Double O Ranch Unit where a good supply of water filled many of the impoundments quite early, the nesting population of ducks increased somewhat. This difference was also further demonstrated by an earlier hatch and subsequent appearance of early broods.

Malheur Lake ordinarily furnishes an excellent post-breeding rendezvous for many species of ducks, but in its present low stage, it has been by-passed in the late summer dispersal, and present August numbers are only a small part of the many milling flightless ducks that ordinarily are expected at this time each year. The scarcity of post-breeding diving ducks this year is especially worthy of note. On the other hand, the extensive, exposed, muddy margins of lakes and ponds of Malheur Refuge are occupied by at least twice as many shorebirds as during last year at this time.

Whistling swan. Swans, along with most other waterfowl, remained later at Malheur this year. Southward migrants had not yet reached the area by the close of the period.

Trumpeter swan. Following their transfer to the Double O Ranch enclosure in February, at least four pairs of trumpeters parted from the others. However, at feeding time each day, nearly all of the flock would come to the shore near the grain bin and feed together, after which they would separate and swim to some favored loafing place. Except for a daily visit to the swan enclosure during feeding, no human intrusion was permitted near the pond. Consequently, little could be learned of possible swan nesting activity except what was visible from a rimrock observation point near the feed bin. At the time of the swan census late in August, the pond and its vegetated margins was carefully searched for evidence of nesting activity. A shallow excavation in the bank behind a stand of cat-tails containing a few leaves of this plant was the only observed indication of a swan nesting attempt. No eggs were present, and in view of the incomplete nature of the nest's construction, it is believed that none were laid.

Sago pondweed and other submergent vegetation grew thriftily throughout most of the pond. Cat-tails formed dense stands in most of the shallow bays and a previously overlooked stand of hardstem bulrush shows promise of spreading and offering additional substantial nesting cover.

May-August, 1950 NR,
Malheur New Refuge - Erickson

To insure an increased amount of nesting cover for swans, it is planned to transplant additional blocks of hardstem bulrush which may be expected eventually to crowd out the less desirable cat-tail.

In addition to the pondweeds, other foods such as American three-square bulrush, spikerush, an undetermined clover, and various grasses are found in the enclosure. That such foods are being used by the swans is indicated in their light grain consumption this summer.

At the time of the August trumpeter census, only twelve were counted in the Double O Ranch enclosure in addition to three located in the spring at refuge headquarters, for a total of 15 swans, leaving two unaccounted for. One of the missing individuals apparently was the unpinioned 1948 juvenile which since has shown up at feeding time on several instances. Several additional searches in the pond among the cat-tails and in the greasewood on the higher ground, as well as careful coverage afoot, by car and by airplane in the rest of the water areas of the Double O Ranch Unit have failed to disclose the whereabouts of the other swan. Unless the other swan appears, the present Malheur swan population totals 16 birds. No evidence of disease in the swan flock has been noted so far this year.

Geese. Canada geese were present in near customary numbers but were very late in nesting and produced few birds. Success of nests under observation, mainly terrestrial and island nests, revealed a low hatch of about 25 per cent. The average clutch contained 4.6 eggs. Predation was the main cause of nesting losses and the raccoon was the most important predator, followed in order by ravens and minks. Predation upon goose nests was most prevalent in the Blitzen Valley along dikes and on islands in the ponds. In addition to the predators mentioned, it is possible that coyotes, bobcats, badgers and skunks may have been implicated in some destroyed goose nests.

As a consequence of the poor goose nesting season, very few broods were seen and the production for Malheur was estimated at below 3,000 goslings. The first flightless geese were seen during the last week of May and by the middle of July they began to make their post-molting appearance.

Ducks. About ten percent fewer ducks remained to nest at Malheur this year than in 1949. This decrease was especially noted with gadwalls and canvas-backs, and to a lesser extent with ruddy ducks. All other residence species seemed unchanged in number.

May - August, 1950 NR
Malheur NWR. - Erickson

As with the geese, early duck nesting was attended with a low rate of success. The abundance of raccoon in the Blitzen Valley rendered dike nesting extremely unproductive until the time that current vegetation growth reduced the efficiency of nest searching by terrestrial predators. The early nesting mallard was most consistently victimized but the nests of the shoveller and pintail also were frequently plundered. Of the later nesting species, namely gadwalls, cinnamon teal, redheads, and ruddy ducks, the earliest terrestrial nests in June had low success ratios, while observed later nests on land and in overwater situations had success rates exceeding 60 percent. Since nest-searching was largely undertaken during inspections of grazing plots, comparatively few nests were found this year and the samples were not deemed adequate for computations of reliable success rates as in the past. However, the fates were followed of enough nests to indicate the main causes of nest loss.

The low level stage of Malheur Lake affected the nesting of both surface-feeding and diving ducks in that area. With the shoreline drawn back from expansive, exposed mud flats lying between the water line and the shore vegetation and Cole Island Dike, very low nesting densities were found in the Malheur Lake unit. In the past years it has become evident that the distribution or location of water and the degree of grazing or trampling of vegetation by stock on Cole Island Dike are the two most important factors involved in the utilization by nesting waterfowl of this structure each season.

Sandhill crane. Transient cranes remained in the Grain Camp area much later than usual this year. Late irrigation of grain fields provided feeding grounds for the cranes which spent most of the time feeding on roots of various weed species, principally Rumex, and perhaps to a lesser extent on waste seed grain. In a small area of about three acres in one wheat field, over fifty cranes habitually were found over a three week period following the time of planting industriously digging and probing in the ground. In spite of this continued occupancy by cranes, the wheat sprouted and came up as regular and as dense as in the remainder of the field indicating that seed grain was probably not being taken in any great quantity by them. The last migrating cranes were seen in the Grain Camp area on May 5, long after the residents had commenced nesting.

Although few nests were found this year, most nesting pairs encountered were successful in hatching one or two chicks, and one pair was reported escorting three newly hatched youngsters. Successful pairs with young were seen in nearly all marshy areas throughout the Blitzen Valley indicating that the high success was rather uniform throughout that part of the refuge.

It is believed that the crane nesting success ranged between 75 and 80 percent this year and this season seems to have been the most productive one for cranes at Malheur of the past ten years. The late summer arrivals were below average for August, and it is believed that this movement is late this year. About 400 cranes could be counted in the Blitzen Valley during the last week of August while more were arriving each day.

American coot. The coot population on Malheur Lake arrived later than usual and the first coot nest with five eggs was found on May 22. The latest newly hatched coots were seen on July 28 giving a coot nesting season of about two and one-half to three months. The production of coots did not seem to increase this year and may possibly have decreased slightly.

Shorebirds and waders. The nesting numbers of avocets and stilts were reduced about 15 percent this year but the post-nesting influx of shorebirds of most species exceeded those of last year by 20 percent. The dowitchers were especially abundant, and although the lake bed to the east of Cole Island Dike was dry by midsummer, the muddy margins of Malheur Lake and in drying ponds of the Double O Ranch unit contained large groups of avocets. Long-billed curlews were slightly less abundant at the refuge this year. Wilson's snipes again appeared to increase, possibly as much as 15 percent over last year's numbers.

Gulls again nested on the north side of Malheur Lake near the mouth of the Silvies River, but three or four thousand gulls, California and a lesser number of ring-bills, occupied the alkali-crusted Stinking Lake bed following their breeding season.

The heron and egret rookeries again were scattered on Malheur Lake. One was noted about two miles east of the "Bat-house" on Graves Point, another was seen south of the mouth of Silvies River, and a small one was noted to the west of Cole Island Dike in the vicinity of the Trapper's Cabin. The production of herons, egrets and American bitterns was about average. Ibises were encountered on Malheur Lake during the nesting season but though no time was spent searching for their nests it is believed that fewer were present this year than a year ago.

Other Water Birds. In response to the shrinking of Malheur Lake, fewer grebes nested here this year. A special search by airplane for a pelican colony was made this year late in June throughout the Malheur Lake unit but none was found, although an estimated 2,000 were censused. As usual cormorants nested on muskrat houses in Malheur Lake and also on some small spoil-bank islands in the west side of Boca Lake.

Species	July			August			Season Totals		
	Brood Class			Brood Class			Brood Class		
	I	II	III	I	II	III	I	II	III
Mallard	4/23 5.7	4/20 5	9/65 7.2	1/7 7		10/66 6.6	5/30 6.0	4/20 5.0	19/131 6.9
Gadwall	223/1759 7.9	103/798 7.7	9/63 7.0	84/507 6.0	136/932 6.9	70/470 6.7	307/2266 7.4	239/1730 7.2	79/533 6.7
Green-winged teal	2/12	3/18		2/14 7.0	3/16 5.3	5/21	2/14 7.0	3/16 5.3	
Am. Pintail	2/10 5.0	2/6 3.0	1/3 3.0	1/4 4.0	1/5 5.0	2/8 4.0	3/14 4.7	3/11 3.7	3/11 3.7
Shoveller	4/15 3.7	1/5 5.0	2/11 5.5	1/2 2.0	1/9 9.0	1/7 7.0	5/17 3.4	2/14 7.0	3/18 6.0
Cinnamon teal	6/34 5.7	10/70 7.0	5/41 8.2	3/20 6.7	10/66 6.4	10/73 7.3	9/54 6.0	20/134 6.7	15/114 7.6
Baldpate	3/17 5.7		1/8 8.0	1/1 1.0			4/18 4.5	1/8 8.0	
Redhead	57/410 7.2	27/163 6.0	2/18 9.0	9/55 6.1	17/111 6.5	8/54 6.7	66/465 7.0	44/274 6.2	10/72 7.2
Canvas back	2/18 9.0	3/17 5.7	3/21 7.0		1/5 5.0	1/9 9.0	2/18 9.0	4/22 5.5	4/30 7.5
Lesser Scaup	4/35 8.7	1/5 5.0			2/12 6.0		4/35 8.7	3/17 5.4	
Ruddy duck	3/20 6.7	9/49 5.4	1/5 5.0	2/7 3.5	8/40 5.0	1/4 4.0	5/27 5.4	17/89 5.2	2/9 4.5
American Merganser			1/13 13.0				1/8 8.0		2/21 10.5
BROOD TOTALS	308	160	34	104	179	104	412	340	137

1950 Malheur Refuge Duck Brood Counts

2. Food and Cover.

The shoreline of Malheur Lake again has fluctuated over the areas which were exposed a year ago and then receded to almost a foot lower elevation than at the end of the same period in 1949. Hardstem bulrush throughout this fluctuation zone is exceedingly thrifty in growth since it is unavailable to muskrats during the winter and is not cut back. In the rest of the lake the bulrush was used moderately by muskrats and no cutting of "eat-out" proportions was noted during the winter so most stands were substantial, containing both new growth and the dry culms of the previous season. Although the emergent vegetation was in good condition for nesting of geese and diving ducks, comparatively few birds nested on the lake this year, possibly due in part to the loss of the marginally inundated sago pondweed belt.

The seed production of smartweeds again was good, and in the Boca Lake area, an early season draw-down and later restoration of the water levels produced the greatest quantity of marginal plant foods, principally of nodding smartweed, seen there since the lake was impounded by the main dike. Continued use of this lake and its margins by waterfowl and broods throughout the last two months of the period were a response of this readily available source of feed.

In the Double O Ranch unit, impoundments maintained for the past three years have enabled the establishment of several fine stands of American three-square bulrush, alkali bulrush, and sago pondweed. Various smartweeds, largely nodding smartweed, are also increasing on this comparatively new area and will eventually be an important source of food to marginal feeders.

3. Botulism.

Since the lake area to the east of Cole Island like dried rather early, a very important potential center of previous botulism epizootics was eliminated. The water of the lake seemed to remain quite clear and fresh in appearance this year with relatively little algal formation. A minor outbreak, probably involving not over 50 ducks throughout the period, was first noticed on August 23 when one sick pintail and two other dead ducks were found in the vicinity of the mouth of the Blitzen River. Another sick duck, perhaps representing initial contamination in Malheur Lake, was found in the Blitzen Valley below the Grain Camp area. No sick ducks were noted elsewhere on the refuge at this time.

4. Lead-poisoning.

No mortality resulting from lead-poisoning was observed.

5. Banding.

No waterfowl were banded during the period.

B. Upland Game Birds.

1. Populations and Behavior.

Ring-necked pheasant. In spite of some nest loss to predators, mainly raccoon, pheasants appeared to have had a good nesting season. Pheasants and broods at the end of the period had not yet appeared in quantity since the haying season was just in progress and much grassy meadow land still provided extensive concealment.

Valley quail. Quail had a good season equal to that of last year throughout most of the Blitzen Valley with many large broods encountered on each trip through the refuge.

Sage hen. Many sage hens again began to appear on the refuge after July, though not quite in the numbers seen last year. A number of them occupied a refuge alfalfa field late in August, along with several deer.

C. Big Game Animals.

Antelope. Fifteen hundred antelope hunting permits were sold by Oregon this year the results of which are not yet available. It is believed that at least moderate success was experienced. The fawn crop in southeastern Oregon was again highly successful this year.

Mule deer. Because of the shortage of grass and succulent browse in the foothills of the Steens Mountain during the deer fawning season, a substantial loss of fawns was reported by biologists of the Oregon State Game Commission. On the refuge, however, conditions permitted a higher survival rate. There was little loss among adult deer.

D. Fur Animals, Predators, Rodents and Other Mammals.

Muskrats. The high trapping success on Malheur Lake last winter (nearly 17,000 muskrat pelts) was fortunate in view of the low water condition of the lake. The present water area is only slightly over half of that existing last winter and it appears that unless an overpopulation of muskrats exists, it will be necessary to recommend a reduced take during the coming trapping season. It is too early to be able to determine approximate populations since there is yet little house-building activity. However, in the remaining water area, a substantial number of muskrats remain.

No mortality of muskrats was noted. A slight increase of muskrats on the Double O Ranch unit was observed.

Beaver. The removal of 34 beavers from the Blitzen Valley resulted in reduced damage to dikes and spoil-banks this summer. A similar program will be recommended during the forthcoming

trapping season to keep nuisance operations of this valuable rodent in check.

Mink. The successful mink removal task during the last trapping season in the Blitzen Valley appears to have aided in reducing nest destruction by minks to a minimum, but annual reduction of mink numbers is a necessity to proper waterfowl management in the better nesting areas of the refuge.

Raccoon. The spectacular increase of raccoons during the past year has raised the importance of this predator to that of first place in the Blitzen Valley. Raccoon sign and track are found along nearly every pond margin, stream or canal in this part of the refuge, and dike nests are especially vulnerable to this predator. The monetary return from sale of the fur of this mammal is exceedingly low so there is not incentive for trapping raccoons by permittees. In fact, most local trappers do not consider the skin worthy of removal from the animal. Consequently, if raccoons are to be reduced to suitable numbers, it will be necessary to hire a trapper exclusively for this work on a predator control basis. The apparently high efficiency of the raccoon's hunting methods along pond and canal margins, together with their present great abundance, have become outstanding obstacles to nest success in most of our productive areas. The present low rodent population probably has figured in this shift in hunting and feeding habits.

Coyote. Coyotes were reappearing commonly at the end of the period and nocturnal howling could be heard at any time after about 8 p.m. late in August. At this season, scat field analysis indicated that coyotes live largely on rodents picked up in mowed meadows, with an occasional coot, duck or shorebird taken along drying ponds. With the continuation of winter poisoning and hunting, it is expected that coyotes will be suitably reduced in number by the time of the next waterfowl nesting season.

Bobcat. Bobcats still are very common and apparently occasionally obtain some waterfowl for food. However, they seem to subsist largely on small mammals and little has yet been found to incriminate them as important waterfowl predators. On May 19, a female wildcat was surprised at her "den" in the wood box of an abandoned frame building in the deserted former "town" of Voltage about three miles southeast of refuge headquarters. Two kittens about three weeks old were found in the box.

Porcupine. Slightly fewer porcupines were observed this summer but several were killed around refuge buildings where they could have been expected to damage the shrubbery.

Other species. A heavy die-off of black-tailed jackrabbits in the refuge and vicinity occurred late in the winter and early spring. Their recovery has been apparent, though it is believed that several years will pass before they approach their 1949 numbers again.

E. Predaceous Birds, Including Crows, Ravens, and Magpies.

Since the inception of intensive coyote-hunting and poisoning, the population fluctuations of the raven have mirrored that of the coyote. Ravens still constitute the most important avian source of nest destruction, but their depredations are few in comparison with the losses caused by mammal activity. The raven nesting situations on and near the refuge were largely unoccupied this year, and the only active nest found was located in the rimrock near the swan enclosure in the Double O Ranch unit. Both parent birds and the nest were destroyed due to its proximity to the swan enclosure. Apparently, most ravens seen on the refuge at the close of the period had drifted in from more distant nest locations.

For some undetermined reason, resident magpies were greatly reduced about the refuge this summer. Many thickets containing nests of preceding generations of magpies contained no occupied nests this year.

Crows were present in customary numbers on the Double O Ranch area.

F. FISH.

Two plantings totalling about 1500 legal-sized trout were made in the Blitzen River in the upper part of the valley and in streams of the Diamond Valley drainage. Because of the great difference in the temperatures of the hatchery and transplant area water, a large proportion of the stock died and later was found at the release points.

Average fishing success by an average number of anglers was had in open waters of therefuge. An unusual concentration of rainbow trout was noticed during August in Sod House Spring pond where trout were seen trying to catch barn swallows as the latter dipped along the water surface for insects.

III REFUGE DEVELOPMENT & MAINTENANCE

A. Physical Developments.

Soil and Moisture Program.

During the period about 30 old structures were repaired for use another season, 76 yards of cement gravel was hauled from the P-Ranch to the Double O, 105 acres of noxious weeds and willows were sprayed and 200 cu. yds. of fill was hauled to complete a dike. The cement work was completed on two diversion dams on the Double O unit and the water turned so that the location of six other diversions would become dry for replacement this fall.

Dragline Project.

The dragline crew indulged in quite a diversified program during the period. For a time the dragline was shut down because of water and since again starting it has been necessary to work on double mats. During the period 11,733 yards of dirt was handled, four new foot bridges were constructed, 468 cu. yds. riprap hauled and placed, 627 cu. yds. road gravel hauled and scattered, four vehicle bridges repaired, four miles of dike leveled and smoothed for vehicle traveling and two and one-half miles of riprap smoothed and repaired.

Equipment and Repair Work Accomplished.

A new motor was installed in the truck trailer unit which adds more power and improves this unit materially. The change over was from a 361 cu. in. to a 450 cu. in. motor.

The Galion road grader was given a complete overhaul and paint job.

The Buick sedan was given a major overhaul which consisted of a ring job and other work of a major nature.

Chevrolet stake truck I-16160 was given a motor overhaul, new brake job, broken glass replaced, body thoroughly repaired and a paint job.

Chevrolet Stake truck I-16161, Chevrolet Dump I-16185, Chevrolet Dump I-16162, Diamond T truck I-16158 received the same repair and paint work.

International Pickup I-18172 was given a valve job and other repair work as required.

Ordinary maintenance was performed on other equipment as required.

Building Repair.

In the carpenter department in addition to regular maintenance required the following jobs were accomplished:

A large window box was provided for the front porch of the Superintendent's residence which provides quite an attractive display of tuberous rooted Begonias and Petunias.

Window screens were provided for the P-Ranch dwelling and apartment dwellings at the refuge headquarters. Several screen doors were built for new doors as well as replacements where required.

The Double O dwelling was repapered and some inside painting accomplished.

Bins and racks were provided in the carpenter shop for storage of paints, miscellaneous hardware and carpenter supplies.

A concrete base was poured and diesel storage tank installed at refuge headquarters. This tank is so located that barrels may be filled on trucks by gravity.

Maintenance Man McElhone lacked half of one roof in painting the dwellings, cellar and light plant building and four car garage at the P-Ranch station. Parts of these buildings will require the second coat as a result of the heat damage suffered at the time the P-Ranch dwelling burned several years ago.

Other Repair Work and Construction.

Almost four miles of new fence was completed on the Double O Unit of the refuge. This was boundary fence on the east side and has materially aided in keeping trespass stock from the fields of this unit.

About a mile of new fence was built from salvage materials between Tracts 37 and 18 on the Malheur Lake Unit of the refuge.

Four miles of fence was rebuilt between Tracts 55 and 13 on the Malheur Lake Unit. Fifteen miles of boundary fence was repaired on the north side of Malheur Lake. This repair job consisted of restapling the wire, replacing all posts rotted away or broken, rebuilding gates and establishing new corners for tightening the wire wherever required.

Interior fences about Sod House Spring were removed which provides a more attractive display area for waterfowl about the refuge headquarters. This could be accomplished after removal of the swan to the Double O.

The alfalfa field near the refuge headquarters was spring toothed and as a result the growth was clean from weeds. This is quite a popular feeding area for geese and deer as well as sage grouse.

A spot was leveled and prepared for the installation of two steel grain bins near the Buena Vista station. It was necessary to locate these bins on a hillside since the grain auger required locating on high ground to reach the opening provided for filling.

On August 23 and 24 a car of coal was unloaded and hauled to the refuge headquarters from the railhead at Burns.

Refuge horses were vaccinated, yearlings branded and colts castrated. The mares were bred and turned on the hill summer range where the insects were not so severe and the rocky ground would tend to harden their feet.

A much needed fire lane was provided about the town of Frenchglen.

An air strip 2,200 feet in length was prepared near Frenchglen and has been used by a number of planes since its completion.

The refuge telephone line was repaired both in the Blitzen Valley-Burns area and the cooperative line into the Double O.

Ordinary maintenance of water control structures and the general handling of the water required considerable time of all personnel until in July.

Two weeks' time of three men was required in handling surplus materials and equipment received from Richland, Washington. This was a worthy project since a large amount of very desirable and much needed materials was received. Since its receipt it has all been allotted to various refuges in the Region and some of it delivered.

B. Plantings.

Cultivated Crops.

Seeding of grain was completed during May with 286 bushels of oats and 250 bushels of barley seeded. This brings the total refuge seeding to 526 acres and something over 300 acres under share crop.

The grain only required one irrigation owing to timely rains. By the end of the period none was ready for combining and the bulk of the wheat had already been taken by waterfowl with inroads made in the barley. Blackbirds were responsible for the major part of the damage, when the grain was in the milk stage. An examination of the ground shows considerable grain threshed out and on the ground which will be available for later use.

One patch of eighty acres sowed to brome and sweet clover with a light nurse crop of rye was cut and bunched for winter use of cattle and heavy utilization of the field by geese is noted. The clover appears quite attractive as well as the

shattered rye, it being quite ripe when cut and bunched. This field could have not been combined satisfactorily because of the green clover growth.

IV ECONOMIC USE OF REFUGE

A. Grazing.

It appeared for a time that forage growth would be short but timely June rains coupled with good growing weather for grass brought on a late growth which produced about a normal crop. Hay has produced as about usual and in some areas better by reason of some fire cleanup work. Double O hay was short but the volume of forage throughout is greater than usual.

Generally, forage conditions on neighboring foothill ranges were short and in some places stock were not in their usual flesh by the end of August.

V FIELD INVESTIGATION OR APPLIED RESEARCH

A. Progress Report.

1. Waterfowl Life History Studies.

Observations on the nesting and brood-rearing of resident waterfowl, as well as early fall migration information, have been included under Section II.

2. Habitat Utilization and Improvement.

Construction of several dams and headgates in canals of the Double O Ranch unit has been continued in order to improve the distribution of water. Nesting conditions in that area were good and the production of ducks and geese was the greatest for this part of the refuge since its acquisition. Although the water "came with a rush" few nest failures occurred due to flooding, and most of the nests hatched between two and three weeks ahead of those situated in the Blitzen Valley administrative units. With the completion of several more headgates, water manipulation at the Double O will be accomplished much more easily and more efficiently and more economical use will be made of the run-off and spring water each year.

As earlier mentioned, habitat utilization by waterfowl on the Malheur Lake was exceedingly low due to the low water conditions. With the increasing demands made on the Silvies River for expanded agricultural land use, it appears that in future "normal" water years Malheur Lake will receive little or no water from this previously important source of water, and will have to depend almost completely on the Blitzen drainage for its water supply.

It also is evident that during average water run-offs from the Blitzen drainage the flow is inadequate to maintain a desirable water level on Malheur Lake in its present form.

Several remedies for this situation have been suggested, but with the present complex pattern of land ownership, nothing can be done in the way of water manipulation to correct this situation. It would appear that the first step toward improvement of Malheur Lake would lie in a vigorous program of land acquisition to the point where management programs would be unfettered by the constant handicap of damage claims and lawsuits. Following the acquisition program, the margins of Malheur Lake would have to be reduced to include only an area of water which could, during most years, be maintained at a desirable range in levels by the flow of available water from the Blitzen drainage. Determining the new area would be an engineering problem which would involve appraisals of water volumes present at various stages of lake levels together with estimates of water loss throughout the year.

Having reduced the surface of Malheur Lake from the previous maximum of about 65,000 acres (half of which ordinarily is dry by late summer and unproductive both of feed and waterfowl), to about 35,000 acres or slightly less of managed lake or deep marsh, the new water body would extend from east of the boathouse in the south to Cane Island on the north, and from Cole Island Dike on the east to Graves' Point on the west. Some diking would be necessary on the north, south, and southwest sides and Cole Island Dike would have to be improved in a number of places. Surplus water above and beyond the needs of Malheur Lake could either be by-passed in a diked canal to Mud Lake and Harney Lake, or could be run through a spillway outlet in Cole Island Dike to the area in the east which has provided such an excellent feeding ground in the past. In low water years, however, all water would be retained in the improved lake basin where with a reduced surface area less loss to evaporation, transpiration and seepage would occur.

The smaller lake, through increased stabilization of water levels, would become perennially more productive of waterfowl both of the aquatic and terrestrial nesting forms, and the present hazards of botulism would be reduced by the deeper lake with more abrupt shorelines. As has been demonstrated on many western refuges, the growing of grain is another substantial attraction to migrant waterfowl. Through irrigation, several large fields of the dried lake bottom could be transplanted with grain while other bottom areas might be allowed to revert to meadow for spring and fall grazing by geese. By these practices, the Malheur Lake unit would become self-sufficient. In its present form it is used largely as a resting area during spring and fall and twice daily many waterfowl fly from ten to thirty miles to privately owned or refuge grain fields to feed.

Another item of importance in the ecology of Malheur Lake and its inhabitants is the proper management of muskrats for the best interests of waterfowl. In the present condition of Malheur Lake, muskrat management is the only real device available for manipulating the cover--open water interspersion, and with the present gross fluctuations of levels and shorelines, the only way we can influence muskrat numbers and distribution is through regulation of trapping pressure. Since the lake area fluctuates so much, many peripheral areas remain unpopulated while in the deeper areas, at the same time, crowding may occur. The result of crowding is often disease or intraspecific fighting or both, resulting in a substantial loss of otherwise marketable furs. Were lake levels and shorelines stabilized, one would anticipate more stabilized populations and the year-to-year harvest also would tend to become static at a higher production level.

As refuge areas are assuming the production of an increasing proportion of the nation's waterfowl output, it is essential that maximum use be made of all available habitat. At present Malheur Lake is furnishing nesting and brood rearing habitat for few birds considering its potential for waterfowl accommodation. By maintaining a body of water from year to year that is adequate for larger numbers of breeders, we may expect to encourage a maximum number of the migrants to remain, which otherwise would go on to more northern and less secure (during drought years) breeding grounds.

The new impoundment in the dense marsh north of Frenchglen was visited periodically this season in order to determine its utilization and productivity. Since the borrow pits and spoil banks were new, there has not been time for the establishment of waterfowl food and cover plants. Although a few geese occasionally were seen resting on the dike, no other goose activity was noted on the pond. A brood of gadwalls was seen on the pond in July but no other ducks were found in the impoundment. It is intended to dry up the impoundment as much as possible during the fall and then disc portions of the heavy bulrush growth in order to see if some of it can be eliminated in this manner. During the current season the bulrush was late in appearing but it made rapid growth after the culms had appeared above the water surface. In addition to the discing, it may be necessary to maintain slightly higher, more uniform levels in the pond. In order to maintain these levels it will be necessary to install a spillway type outlet which can accommodate varying amounts of run-off water. Photographs of the new impoundment have been included in this report.

On August 10, the first wild rice was found growing in the East Canal about one mile south of Boca Lake. There were two separate stands containing a total of about 65 culms and covering an area of about 20 square feet (Fig. 3). The plants were about five feet in height and were growing in 12-16 inches of water on a firm bottom. On August 18 the first seeds of wild rice were ripening, so a small quantity was collected and planted near the inlet of Boca Lake with the locations carefully noted.

On September 1, another half pint of wild rice seed was collected and planted in three situations in Boca Lake. The remaining seed on the plants has been allowed to shatter and fall in the water to provide growth again next season. Apparently this patch of wild rice was a result of plantings made during the war. The plants produced substantial quantities of seed and it is hoped that the wild rice may crowd out less desirable semi-emergent species in the marshy portion of Boca Lake.

VI PUBLIC RELATIONS

A. General.

We believe that more than the usual run of tourists visited the refuge during the period.

On July 17 J. Lynn Wykoff, feature writer for the Oregonian, and Sidney King, Editor, Oregon Motorist, visited the refuge and as a result a very fine article appeared in the Sunday edition of the Oregonian which resulted in quite a number of folks coming to the refuge during their vacation trips and a lot of inquiries.

On July 27-28 Mr. Jas. Savage, Game Management Agent, stationed at Klamath Falls, Oregon, and Mr. Tom O'Dwyer and Dr. Ray McNair visited the refuge. As a result of this trip a very fine article appeared in the Klamath News telling about the refuge and work generally being done by the Fish & Wildlife Service.

On May 6 Superintendent Scharff attended the Three Flags Highway meeting in Burns.

On May 7 a group of 17 spent the day on the refuge. Although the day was cold and rough, it is believed that these folks enjoyed the day and saw a lot of interest to them.

Other meetings attended during the period were Chamber of Commerce and Izaak Walton League meetings.

B. Refuge Visitors.

In addition to the usual business and tourist visitors those of special note included the following:

May 6 Gail Thomas, Amateur Photographer, Portland, Ore.

May 8 & 9 John E. Schwartz, Refuge Mgr., Sheldon Refuge

May 11 to

June 20 W. F. Kubichek, Wildlife Photographer from Washington, D. C.

May 24-25 Vincent Hunter, Official Photographer for Union Pacific Railway.

June 20 Wm. Ritter, Regional Supervisor, Predator and Rodent Control, Portland, Oregon

June 28-30 Ross Hanson, Pilot Biologist, Sacramento Refuge, Willows, Calif.

July 12-13 Kenneth F. MacDonald, Regional Refuge Supervisor, Portland, Oregon
Roland Schaar, Assistant Realty Officer, Branch of Lands, Portland, Oregon

July 16	Paul G. Heiaschler, Supt. of Maintenance, University of Calif., Berkeley, Calif.
July 17	J. Lynn Wykoff, The Oregonian, Portland, Ore. Sidney King, Editor Oregon Motorist, Portland, Ore.
July 18-20	Mrs. G. Neilsen, Los Gatos, Calif., Coopers Club Audabon Society, etc.
July 27-28	Jas. Savage, Game Management Agent, Klamath Falls, Ore. Thos. O'Dwyer, Klamath Falls, Oregon Dr. Ray McNair, " "
July 30 to August 1	Francis Uler, Patuxent Refuge, Maryland
August 9	Dan S. Willey, Maintenance Foreman, Sacramento Refuge, Willows, Calif.
August 10	Elmo G. Adams, Refuge Manager, Hart Mt. Refuge
August 15-17	Chas. Rouse, Biologist, Lakeview, Ore.
August 15	Baine Cater, Refuge Manager, Ruby Lakes Refuge, Nevada

C. Refuge Participation.

On August 14 the Refuge Superintendent spent the day with the President's Task Force on the Squaw Butte Range Experiment Station and in discussing the refuge administrative problems and procedures.

On August 18 the annual meeting of the American Society of Range Management was attended by Superintendent Scharff.

August 22-26 was entirely spent by Superintendent Scharff in attending Federal Court which was held in Burns.

VII OTHER ITEMS

A. Items of Interest.

From May 11 to June 20 W. F. Kubichek, Wildlife Photographer, spent the time on the Malheur Refuge and neighboring refuges taking pictures. Transportation was furnished by the Malheur Refuge in the way of the latest International Pickup. Assistant was rendered as required by Refuge Maintenance Man McElhone, Biologist Erickson and Superintendent Scharff.

On May 12 Superintendent Scharff accompanied Mr. Kubichek to Hart Mt. to plan with Refuge Manager Adams for pictures and to check general photo conditions.

June 13 to 17 Superintendent Scharff accompanied W. F. Kubichek and assisted in his photographic work at Stillwater, Sheldon and Hart Mt. refuges. Weather poor and subject scattered and wild at Sheldon and Hart Mt. refuges.

During June Superintendent of Construction Marselle Leake hauled the Red Rock Lake Refuge's carryall scraper from Malheur to Red Rock Lakes.

On August 15 Leake, Cagle and Porter returned the dump trucks which were on loan from Tile Lake refuge. To economically handle the required riprap work this fall, arrangements will of necessity have to be made for the loan of more dump trucks.

During August 29 to September 2 Superintendent of Construction Leake delivered a load of surplus materials to Willapa Refuge and while there inspected the Link Belt speeder dragline and reported to the Regional Office the parts and labor required to place this machine in good operating condition.

On June 21 the refuge herbarium was moved from the Buena Vista station to refuge headquarters where it is housed in the office bunkroom.

On July 19 mid-July brood census undertaken by Younger and Erickson.

On August 29 a large number of black and white enlargements and about 140 kodachrome transparencies were loaned to the Harney County Chamber of Commerce for use in an automatic projector in their booth at the Oregon State Fair.

On August 31 Oregon State Biologists Claggett, Cummings and Mason visited the refuge.

During August the refuge cement mixer and end loader was loaned the Sheldon refuge for Soil and Moisture work being performed on that area. Mr. Cagle did the moving with the semi-trailer unit.

On August 31 the Sunshine Garden Club held their annual meeting at the Refuge Headquarters. Thirty-six members and guests were present. Dr. Erickson showed a number of refuge color slides to this group.

On June 26 a group of twenty-six men, women and children from the Malheur refuge attended the Hart Mt. picnic which was held at the old Post. A most enjoyable time was had by all those attending.

September 22, 1950

J. C. Scharff
Superintendent

Approved

WATERFOWL

Refuge MalheurMonths of Mayto August1945

(1) Species		(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
Common Name		Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u>										
Whistling swan		300	May 1	300	May 1	1	6/5			700
II. <u>Geese:</u>										
Canada goose		perm. resident		20,000	Aug. 31	Resident		100	3,700	30,000
Cackling goose										
Brant										
White-fronted goose										
Snow goose										
Blue goose										
III. <u>Ducks:</u>										
Mallard					Aug. 31	Resident			8,000	160,000
Black duck										
Gadwall				75,000	" 1	"				
Baldpate				12,000	" 31	"			43,000	100,000
Pintail				85,000	"	"			50	20,000
Green-winged teal				2,500	"	"			2,000	125,000
Blue-winged teal				125	" 7	"			200	8,000
Cinnamon teal				14,000	" 14	"			50	1,000
Shoveller				8,000	" 1	"			13,000	20,000
Wood duck				11,000	11,000	"			3,000	12,000
Redhead				11,000	" 5	"			8,000	20,000
Ring-necked duck									8,000	20,000
Canvas-back				1,200	" 7	"			50	1,500
Scaup				6,000	May 1	"			1,000	8,000
Golden-eye										
Buffle-head										
Ruddy duck		6	June 23	800	May 1	10	May 25			1,500
				10,000	May 8	Resident			4,000	15,000
				100	July 25	"			75	150
IV. <u>Coots:</u>				210,000	Aug. 31	"			13,125	
									200,000	500,000

SUMMARIES

Total Production:

Geese 3,700

Ducks 82,425

Coots 200,000

Total waterfowl usage during period 1,022,850

Peak waterfowl numbers 421,000

Areas used by concentrations Malheur Lake, Upper Blitzen Valley Ponds, OO Ranch ponds.

Principal nesting areas this season Blitzen Valley

Reported by _____

R. C. Erickson, Biologist

INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since these data are necessarily based on an analysis of the rest of the form.

3-1751

Form NR-1A

(Nov. 1945)

MIGRATORY BIRDS
(other than waterfowl)Refuge MalheurMonths of May to August 1945

(1) Species	(2) First Seen		(3) Peak Numbers		(4) Last Seen		(5) Production			(6) Total
Common Name	Number	Date	Number	Date	Number	Date	Number Colonies	Total # Nests	Total Young	Estimated Number
I. <u>Water and Marsh Birds:</u>										
Eared grebe			10,000	8/15				3,000	7,000	20,000
Western Grebe			2,000	8/15				700	1,200	6,000
Pied-billed grebe			4,500	8/20				1,800	3,000	11,000
White pelican			2,000	8/31						2,300
Farallon cormorant			2,500	8/31				800	1,500	3,500
Treganza's heron			1,000	8/31				350	400	2,000
American egret			500	8/31				225	200	800
Brewster's egret			250	8/31				50	100	300
Black-crowned night heron			5,000	8/31				1,800	3,000	8,000
American bittern			1,500	8/31				350	800	2,500
Sandhill crane			400	8/31				100	170	700
Virginia rail			800	8/31						
Sora rail			1,400	8/31						
White-faced glossy ibis	5	5/23	30	8/31						
II. <u>Shorebirds, Gulls and Terns:</u>										
Killdeer			2,000	8/15						7,000
Long-billed curlew			300	8/15						800
Spotted sandpiper			100	8/31						300
Western Willet			100	8/1						150
Dowitcher	1	7/21	15,000	8/15						25,000
Avocet			10,000	8/10						15,000
Black-necked stilt			400	8/15						500
California gull			25,000	8/31						35,000
Ring-billed gull			3,000	8/31						8,000
Franklin's gull			30	8/31						40
Forster's tern			40,000	7/20						80,000
Caspian tern			10	7/31						30
Black tern	250	5/19	30,000	8/1						65,000
Wilson's phalarope			3,000	7/31						7,000

(over)

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons:</u>					
Mourning dove		4,500	8/20		3,000
White-winged dove					8,000
IV. <u>Predaceous Birds:</u>					
Golden eagle		10	8/31		4
Duck hawk					14
Horned owl		30	8/31		15
Magpie		1,200	8/31		50
Raven		100	8/31		300
Crow		500	8/31		25
Swainson's hawk		60	8/31		200
Red-tailed hawk		30	8/31		800
Ferruginous rough-leg		6	8/31		20
					85
					40
					10
Reported by <u>Ray C. Erickson, Biologist</u>					

INSTRUCTIONS

- (1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiformes)
 II. Shorebirds, Gulls and Terns (Charadriiformes)
 III. Doves and Pigeons (Columbiformes)
 IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous Passeriformes)
- (2) First Seen: The first refuge record for the species for the season concerned.
- (3) Peak Numbers: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned.
- (5) Production: Estimated number of young produced based on observations and actual counts.
- (6) Total: Estimated total number of the species using the refuge during the period concerned.

3-1752
Form NR-2
(April 1946)

UPLAND GAME BIRDS

1613

Refuge Malheur

Months of May to August, 19450

(1) Species	(2) Density		(3) Young Produced		(4) Sex Ratio	(5) Removals			(6) Total	(7) Remarks
Common Name	Cover types, total acreage of habitat	Acres per Bird	Number broods obs'v'd.	Estimated Total	Percentage	Hunting	For Re- stocking	For Research	Estimated number using Refuge	Pertinent information not specifically requested. List introductions here.
Ring-necked pheasant									5,000	
Valley quail									1,000	
European partridge									125	
Sage hen									500	

INSTRUCTIONS

Form NR-2 - UPLAND GAME BIRDS.*

- (1) SPECIES: Use correct common name.
- (2) DENSITY: Applies particularly to those species considered in removal programs (public hunts, etc.). Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.
- (3) YOUNG PRODUCED: Estimated number of young produced, based upon observations and actual counts in representative breeding habitat.
- (4) SEX RATIO: This column applies primarily to wild turkey, pheasants, etc. Include data on other species if available.
- (5) REMOVALS: Indicate total number in each category removed during the report period.
- (6) TOTAL: Estimated total number using the refuge during the report period. This may include resident birds plus those migrating into the refuge during certain seasons.
- (7) REMARKS: Indicate method used to determine population and area covered in survey. Also include other pertinent information not specifically requested.

* Only columns applicable to the period covered should be used.

REFUGE GRAIN REPORT

Refuge Malheur

Months of May thru August 1945.

(1)	(2)	(3)	(4)	(5)			(6)	(7)			
VARIETY	ON HAND BEGINNING OF PERIOD	RECEIVED DURING PERIOD	TOTAL	GRAIN DISPOSED OF			ON HAND END OF PERIOD	PROPOSED USE			
				TRANS- FERRED	SEEDED	FED		TOTAL	SEED	FEED	SURP.
Wheat	470		470			120	120	350	100	250	
Barley	1530		1530		250	240	490	1040	250	790	
Oats	814		814		286	200	486	328		328	
Rye	50		50					50	50		

- (8) Indicate shipping or collection points.....
- (9) Grain is stored at.....Malheur Refuge Hdqtrs.; P-Ranch; Buena Vista; & Double O.....
- (10) Remarks.....

NR-8a

REFUGE GRAIN REPORT

This report should cover all grain on hand, received, or disposed of, during the period covered by this narrative report.

Report all grain in bushels. For the purpose of this report the following approximate weights of grain shall be considered equivalent to a bushel: Corn (shelled)—55 lbs., Corn (ear)—70 lbs., Wheat—60 lbs., Barley—50 lbs., Rye—55 lbs., Oats—30 lbs., Soy Beans—60 lbs., Millet—50 lbs., Cowpeas—60 lbs., and Mixed—50 lbs. In computing volume of granaries, multiply the cubic contents (cu. ft.) by 0.8 bushels.

- (1) List each type of grain separately: Corn, wheat, proso millet, etc. Include only domestic grains; aquatic and other seeds will be listed on NR-9.
- (3) Report all grain received during period from all sources, such as transfer, share-cropping, or harvest from food patches.
- (4) A total of Columns 2 and 3.
- (6) Column 4 less Column 5.
- (7) This is a proposed breakdown by varieties of grain listed in Column 6.
- (8) Nearest railroad station for shipping and receiving.
- (9) Where stored on refuge: "Headquarters grainary", etc.
- (10) Indicate here the source of grain shipped in, destination of grain transferred, data on condition of grain, unusual uses proposed.

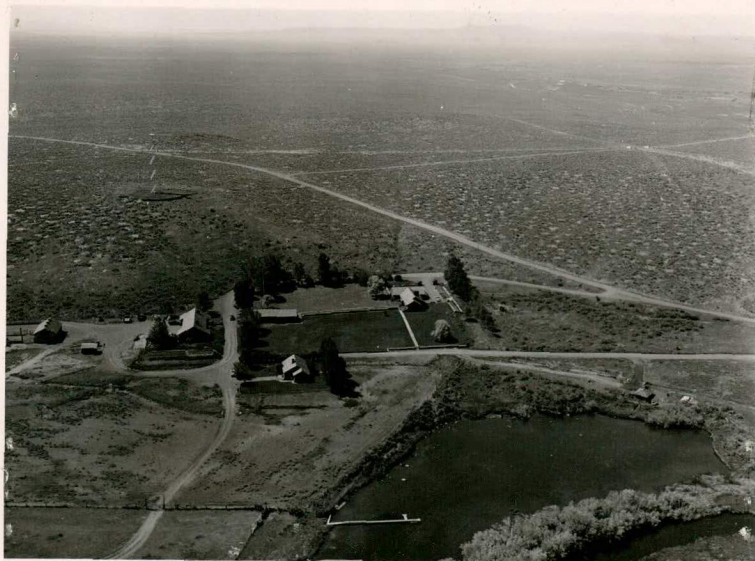


Fig. 1 Malheur Refuge Headquarters and Sod House Spring. June 29, 1950. RCE 50 06 FP 003 11



Fig. 2 Aerial photograph of P-Ranch buildings and grounds. June 29, 1950. RCE 50 06 FP 003 03



Fig. 3 First record of wild rice growing
on Malheur Refuge along the East
Canal, Unit 3, about one-half mile
south of Boca Lake. 8/10/50
RCE 50 07 FP 002 10



Fig. 4 Fringed water-plantain (Machaerocarpus
californicus growing on OO Ranch Unit
7/31/50 RCE 50 07 FP 002 05



Figs. 5 & 6 New impoundment in dense marsh about
one mile north of Frenchglen. June 29,
1950 RCE 50 06 FP 002 11 & RCE 50 06
FP 002 12

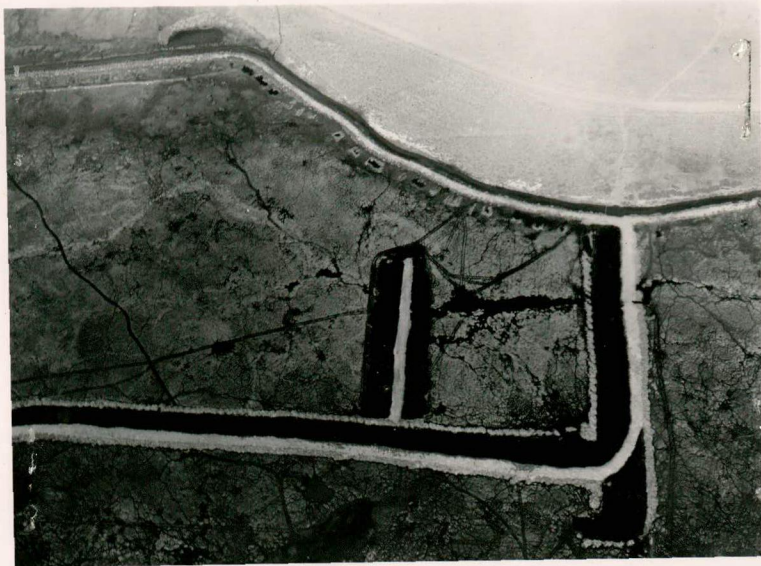




Fig. 7 Although swamp smartweed (Polygonum muhlenbergii) is common at Malheur and flowers profusely, it seldom fruits.
8/9/50. RCE 50 07 FP 002 09



Fig. 8 Wilson's snipe nest in the marsh just south of P-Ranch buildings. 8/21/50
RCE 50 05 FP 003 09



Fig. 9 Spraying of isolated plants or colonies of weeds was facilitated by the use of a horse and a tank-type hand sprayer. 7/6/50
RCE 50 07 FP 001 02



Fig. 10 Spraying with tank-type sprayer of water hemlock. 7/7/50 RCE 50 07 FP 001 06



Fig. 11 Water hemlock patch in Buena Vista area
prior to spraying with ester of 2-4-D
7/7/50. RCE 50 07 FP 001 04



Fig. 12 Same water hemlock patch following
spraying about one week later. 7/13/50
RCE 50 07 FP 001 08